Imagery Systems for Enhanced Crew Habitability Onboard ISS

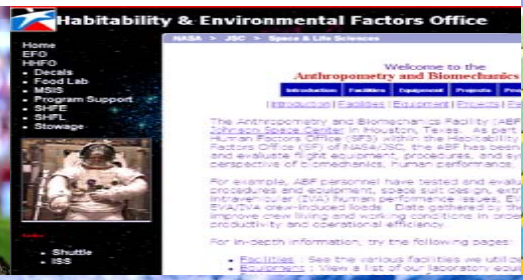
Imagine



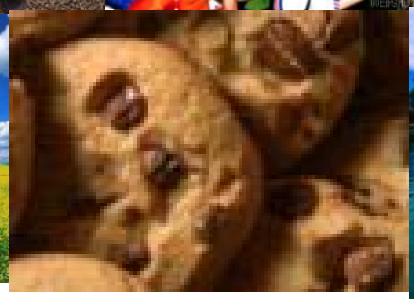

You had a Magic Window
On the ISS

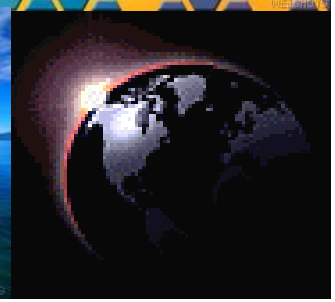
Through which you could see anything you wanted…











Project Team and Funding

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Imagery Systems

for Enhanced Crew Habitability, Performance, and Productivity on the International Space Station

Issue: Success of the mission will be dependent on crew performance against a background of confinement in a largely unchangeable environment

Potential Solution: Improve Habitability to Enhance Crew Performance and Productivity on ISS with Imagery Systems Technology (or a Magic Window)

Potential Impacts:

- Maintenance/ improvement of crew habitability and productivity
- Improved communication and situational awareness
- Improved compliance with exercise protocol

Magic Window Project Goals

The **overall goals** of the Magic Window project are to:

- Create an integrated multimedia environment on ISS to augment crew habitability and functionality
  - Provide enhancement to crew habitability during recreational activities, personal time, and exercise
  - Provide an optimized human-computer interface for crew functionality in tasks, procedures, and planning

- Gain knowledge on the functional needs of an imagery system for crewmembers on future long-duration missions (exploration missions, space analogs, etc.)

Magic Window Integrated System Definition

What do we mean by an Imagery System or “Magic Window”?

- Imagery systems (e.g., flat screen technologies) could display desired information for work or recreation
- Examples include:
  - Display a changing scene when exercising on a treadmill

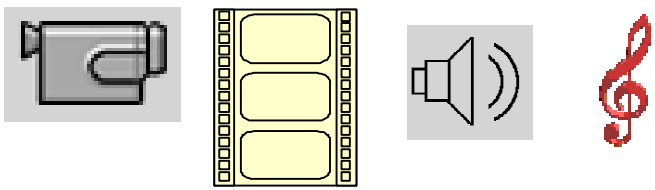
    ‘Running through the park’
  - Teleconferencing
  - Display mission related information/procedures with corresponding video

Magic Window Integrated System Concept Development

Magic Window Technology
For personal or group use

Exercise Enhancement
e.g. Show desired terrain

Recreation Activities
- Movies
- Games
- Music Visualization



Task Functionality
Possible Enhancements
e.g. Medical System Features, Maintenance activities

Magic Window System Possibilities

Computer Workstation Displays

Computer/TV Large LCD Crew Displays

Magic Window could be:

VR Headsets

Personal Mobile Displays

Remote Wireless Cameras

Project Status Overview

- Feasibility and Technology Review
  - Generated a matrix of existing technologies not currently aboard ISS to compare with existing ISS requirements (e.g. kickloads, translation, and power limits)
  - Identified current on-board systems

- Administered Survey to determine desired functionality of a Magic Window
  - Created list of functional requirements based on survey results

Possible Available Technologies

- XCam2 Wireless Camera 2.4 GHz
- CLIE PEG NR70V 16 MB PDA w/built in Digital Camera
- Palm m515 Handheld, 16 MB Memory
- AG NEOVO S-19 S-Series 19” LCD Monitor Display (PC compatible)
- CORNEA CT1810 18.1” LCD Monitor (PC compatible)
- Wireless Augmented Reality Prototype (WARP) -- consisting of a lightweight, unobtrusive heads-up display paired with wireless, wearable control unit.

Existing Technologies Currently Certified or On-board ISS

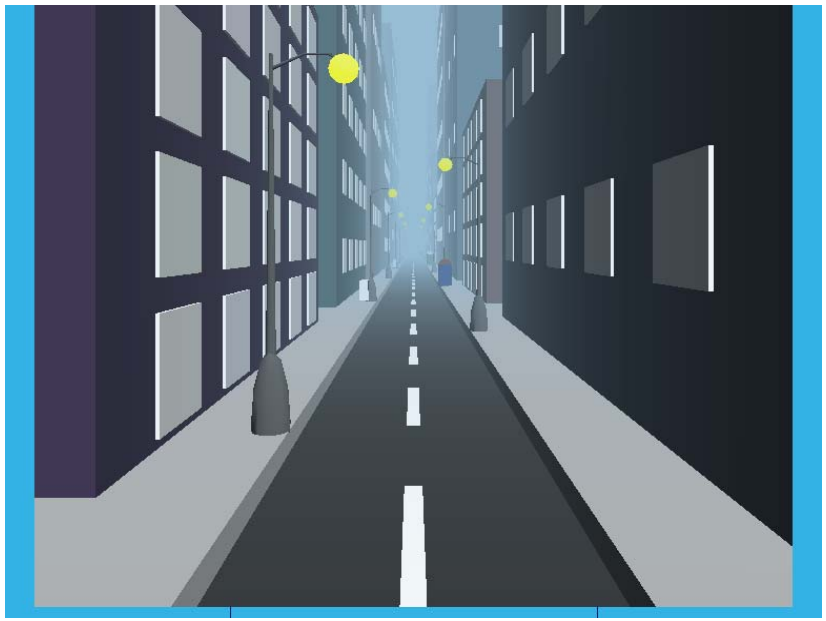
- Clio – Smaller than laptop, bigger than PDA
- IBM 760XD laptop – Monitor 11.5”/View space 9.75
- Sony DVD TV – Flat screen monitor (flight certified but not on-board yet)
- RWS payload Display
- HRF’s VAMP 22” AMTFT Flat Panel Monitor
- DT/Energia’s NEC 2010 LCD Monitor (20.1” diagonal)

Potential Functional Requirements

(Based on Preliminary Survey Findings)

- **Provide exercise system features**
  - Integrated system to show terrain, time. distance, speed, and physiological measures
  - Rated highest
- **Show movies for entertainment**
- **Possible medical system features integration**
- **Magic Window System should be:**
  - portable, have partitioned and continuous screen capability, and audio speaker
- **Potential negative impacts:**
  - Too much dependency (what if system failed?), cost of implementation, system speed (too slow), possible distraction to crew

Examples for Exercise Application

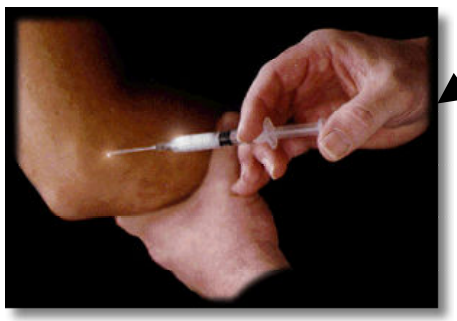


Select from a List of Track Scenes while on Treadmill

Examples of Possible Medical Applications

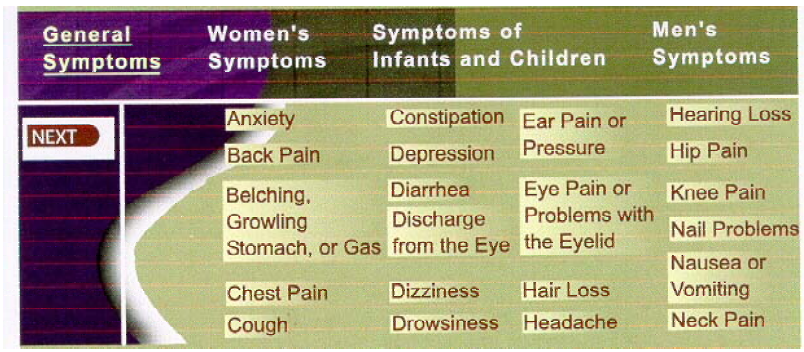
Medical Applications

Treatment and procedures



Location of items within medical kits

Computer-aided Diagnosis



What will we do next?

- Crew and Crew Support Information will be integrated with existing feasibility findings and candidate hardware will be identified
- Usability Testing of identified candidate hardware
- Field testing of hardware
- Develop set of requirements and guidelines for a Magic Window System that could be implemented on ISS (Implementation Plan)